

Claims

1. A pump comprising:

a movable member at least partially defining a fluid cavity, the member being movable between a first position associated with a first volume of the cavity and a second position associated with a second volume of the cavity, and the member capable of being cycled between the first position and the second position at least one time;

an actuator including a shape memory alloy material to drive the movable member from the first position to the second position as the shape memory alloy material goes through a dimensional change caused by one thermally induced phase transition; and

a biasing element arranged to drive the movable member from the second position to the first position.

2. The pump of claim 1, wherein the first volume is a minimum volume of the cavity and the second volume is a maximum volume of the cavity.

3. The pump of claim 1, wherein the first volume is a maximum volume of the cavity and the second volume is a minimum volume of the cavity.

4. The pump of claim 1, further comprising an inlet and an outlet both in fluid communication with the cavity.

5. The pump of claim 4, wherein fluid is drawn into the cavity through the inlet by the movable member being moved from the first position to the second position, and fluid is expelled from the cavity through the outlet by the movable member being moved from the second position to the first position.

6. The pump of claim 4, wherein fluid is drawn into the cavity through the inlet by the movable member being moved from the second position to the first position, and fluid is expelled from the cavity through the outlet by the movable member being moved from the first position to the second position.

7. The pump of claim 1, further comprising an inlet and an outlet both in fluid communication with the cavity, the inlet including a first check valve permitting fluid to only

flow from the inlet to the cavity, the outlet including a second check valve permitting fluid to only flow from the cavity out the outlet.

8. A fluid delivery system comprising:

a movable member at least partially defining a fluid cavity, the cavity having an inlet and an outlet, the member being movable between a first position associated with a first volume of the cavity and a second position associated with a second volume of the cavity, and the member capable of being cycled between the first position and the second position at least one time;

an actuator including a shape memory alloy material to drive the movable member from the first position to the second position as the shape memory alloy material goes through a dimensional change caused by one thermally induced phase transition;

a biasing element arranged to drive the movable member from the second position to the first position;

a controller that provides electrical energy to the actuator; and

a fluid reservoir coupled to the inlet of the cavity.

9. A method of fluid delivery comprising:

providing a movable member to at least partially define a fluid cavity;

changing the temperature of a shape memory alloy material to move the member from a first position associated with a first volume of the cavity to a second position associated with a second volume of the cavity in one generally uninterrupted motion;

returning the shape memory alloy material generally back to an original temperature; and

moving the member from the second position back to the first position.

10. The method of claim 9, further comprising cycling through all but said providing.